

mode is followed, and all are arranged stratigraphically, without any attempt to show the more interesting developmental or time-series. Thus, in both cases the most interesting and instructive methods of arrangement are entirely neglected in favour of systems which are adapted solely to facilitate study by specialists, but which are comparatively unimportant and uninteresting to the public. Even to this day it does not seem to be realised by curators of museums, that the collections for study and those for public exhibition require to be arranged upon totally distinct plans; and that the method which is the very best in the one case may be, and usually is the very worst in the other.

ALFRED R. WALLACE

Geology of the Counties of England and of North and South Wales. By W. Jerome Harrison, F.G.S. (London: Kelly and Co., 1882.)

ALL who have had occasion to use the valuable Post Office Directories of the English counties published by Messrs. Kelly and Co., will have noticed that the imperfect notes on geology contained in former editions have now been replaced by very accurate and well-written articles on the subject. These notes on the geology of the English counties have been drawn up, evidently with much skill and labour, by Mr. W. J. Harrison. In each case the scattered maps and publications of the Geological Survey have been very carefully studied, and the various memoirs and notices on the geology of each of the counties contained in miscellaneous journals and magazines faithfully summarised. The result is that the numerous readers of those widely diffused publications, the County Directories, have at hand a reliable sketch of the geology of the district in which they live, carefully brought down to the date of publication. What is perhaps of still greater importance is, that these sketches include references to all the principal works bearing on the subject, so that the reader is told where he may find fuller and more detailed information upon any point in which he may be interested. We can scarcely conceive a method by which useful geological information could be more widely diffused, or made more easily available for those who wish to obtain correct ideas concerning the geology of the district in which they live. These sketches of the Geology of the English Counties have now been collected into a volume, and constitute a very useful work of reference. We have tested it in many ways, and find that in almost every case the latest information, even when published in journals of very restricted circulation, has been discovered and made use of. Mr. Harrison's essays are clearly written, and each of them is preceded by a list of the local Natural-History and Scientific Societies, the members of which collect information bearing on the geology of the county; of the museums in which rocks and fossils from the county are preserved; of the publications of the Geological Survey bearing on the county; and of such other works as in any way refer to the subject. In all cases where he was in doubt Mr. Harrison appears to have sought the assistance of competent authorities, the result being a work which is exact, and at the same time is written in a popular style. There are numerous excellent woodcuts, most of which appear to be taken by permission from the publications of the Geological Survey and the Geological Society. We can heartily recommend this book as a convenient and reliable work of reference.

University College Course of Practical Exercises in Physiology. By J. Burdon Sanderson, M.D., LL.D., F.R.S., with the Co-operation of F. J. M. Page, B.Sc., F.C.S., W. North, B.A., F.C.S., and Aug. Waller, M.D. 8vo, pp. 75. (London: H. K. Lewis, 1882.)

THIS book is a *multum in parvo*. It gives in a most condensed and yet most clear and precise form, an account of the method of performing the most important experiments in physiology. It will be useful not only to

students, but to practitioners who wish, with a small expenditure of time and labour, to become acquainted with the present state of our information, and the most important points in physiology, and the experimental data on which our knowledge rests. The exercises relating to the physiology of muscle and nerve are especially worthy of commendation. They make clear to the student the different arrangements of electrical apparatus, the comprehension of which is to many an insuperable difficulty, not only during their student's career, but during the whole of their lives. The few and simple diagrams in the text are just what were wanted to make the experiments readily understood. Half an hour spent with this little work will, we think, give to the beginner a better grasp of the subject of which it treats than days spent over more elaborate text-books, however good the latter may be for advanced students.

Mémoires de la Société des Sciences Physiques et Naturelles de Bordeaux 2^e série, tome iv. 2^e cahier. (Bordeaux: 1881.)

WE draw attention to this number specially for the benefit of such as are interested in the early history of arithmetic. It contains (pp. 161-194) an able paper by M. Paul Tannery (who is known by his previous similar work upon the "Collection Mathématique" of Pappus in tome iii. pp. 351, &c., of these same *Mémoires*) on "l'Arithmétique des Grecs dans Héron d'Alexandrie." He goes carefully into the question of the authenticity of the several so-called Heronian writings, and analyses those which he accepts, and concludes with one or two specimens of the approximate methods employed. We need only mention the names of Cantor, Martin, Hultsch, and Rodet as being those of the authors whose works and statements are discussed. Other papers are: M. Hauteux, "Etudes météorologiques de la Gironde à la Plata"; M. Millardet, "Pourridie et Phylloxera; étude comparative de ces deux maladies de la vigne"; M. Royer, "Recherches sur le passage du mercure à travers les liquides"; and M. Ponsot, "De la reconstitution et du greffage des vignes." From this enumeration it will be seen that some of the papers are of a very practical character, touching the interests of the commonalty. M. Debrun contributes a short note (and illustration), "Sur un nouveau baromètre amplificateur."

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Hypothetical High Tides

I SHOULD like to be allowed to ask two questions on this subject: First. Could the vegetable accumulations from which the coal has resulted have escaped destruction if, during their subsidence, the world was subject to such tides as Mr. Ball postulates? It is difficult to understand how this could be if the shales and sandstones which overlies the coal be of marine or estuarine origin. Second. What do the Palaeozoic conglomerates disclose on the subject? The shingle of beaches heaped up by the tide, having each layer of sand and pebble laid at the slope of the beach face, exhibits when cut at right angles to the trend of the beach the continuously oblique bedding which represents this slope, the vertical heights of the shingle bed thus laid up representing the extreme rise and fall of the tide and surges. This may be seen in the case of the Lower Eocene shingle in Bickley Cutting of the Dover Railway and in the case of the early Glacial shingle in deep pits at Henham and Halesworth in Suffolk. The latter show a tidal rise and fall there of more than twenty-five feet, the former not so much. The same structure obtains in the case of sandbanks left dry by the tide, and of such

nearly all the Red Crag consists, the oblique layers of sand and shell corresponding to the oblique layers of sand and shingle in beaches. I have seen this structure extending for some distance in a railway cutting through Jurassic sandstone, but there was nothing to indicate that the tidal slope under which it was formed was greater than in the case of the Crag. It may be otherwise for aught I know with the old conglomerates, for I am not acquainted with them.

S. V. WOOD

DR. CALLAWAY points out that there would be nothing in the nature of the older deposits to indicate the existence of excessive tidal action. One point, however, suggests itself to me in connection with the increased force of winds and currents, which must necessarily have accompanied the high tides and more rapid rotation of earlier epochs.

While the general nature of the Palæozoic strata indicates that they were deposited along the margins of continental or insular masses of land, there is a remarkable absence of estuarine conditions in the older Palæozoic rocks. Indeed, except in some portions of the Carboniferous deposits, in which beds of coal occur together with such marine species as *Goniates* and *Aviculopecten*, there seem to be no beds of Palæozoic age which can with certainty be referred to an estuarine origin. The earliest plant-remains, such as *Eophyton*, from the Fucoidal sandstone of Sweden, are probably marine algae, which currents might transport to great distances from land.

Now considering the frequency with which delta deposits occur in Neozoic strata, the almost entire absence of them during the immense earlier periods is a fact which seems to require some explanation.

Now it seems highly probable that excessive tides would have disturbed even inland seas (if any existed at that time) which are most favourable for the accumulation of deltas, and that strong marine currents would scour out even those sheltered estuaries, which, with moderate tides, would have been, like those now existing in the Mediterranean, comparatively free from tidal action. The delta of the Ganges is nearly the only instance of a great river delta forming in spite of tidal fluctuations; but, although the average height of the tide here seldom exceeds 10 feet, even this moderate amount is sufficient to prevent the delta from pushing its way far out to sea.

Another point which must not be lost sight of, in considering the influence of stronger oceanic currents, is the greater distance to which the coarser materials might be carried out to sea; so that it would not necessarily follow that those deposits, which we are accustomed to regard as evidence of the proximity of land, are of littoral origin. For with strong currents, even coarse grits and conglomerates might be widely distributed over the ocean floor.

J. VINCENT ELSDEN

Storrington, February 25

Palæolithic Man and Löss

I HAVE just been reading Geikie's "Prehistoric Europe," and am much interested by his digest of Dr. Nehring's discovery at Thiede and Westeregeln. At p. 150 it is stated that "the lower beds at Westeregeln have yielded traces of man such as flint flakes, charred wood, and heaps of smashed and crushed bones of various animals." And further on, "that they could not have come from any distance, an inference which is in keeping with the generally unrolled character of the stones and the state of preservation of the fragments of wood." At p. 151 he describes another interesting find by Count Wurmbrand near Zeiselberg. "At that place the undisturbed löss yielded a rich deposit of bones underneath which occurred a blackish stratum abounding with fragments of charcoal and worked flints." From the general appearance presented by the human relics and animal remains (mammoth, rhinoceros, reindeer, &c.) "it was evident that they could not have been transported from any distance."

An idea seems to be conveyed here that the remains in both cases had been carried by water and redeposited, but it appears to me that they have been found just where Palæolithic man left them. From the experience gained by eleven or twelve years' study of the sand-hills round the northern coast of Ireland and the finding of blackish layers containing flint flakes, implements, and broken bones of Neolithic age, I believe Dr. Nehring and Count Wurmbrand have hit on old land surfaces on which Palæolithic man lived; that the fragmentary bones have been scattered about by him after using the flesh for food; and that

the unrolled stones can be accounted for by supposing that he carried them to the spots where they were found.

The blackish layers in the sand-hills of the Irish coast, which I have found to contain flint flakes and implements, are covered with a great thickness of sand, and I have on several occasions expressed my opinion that this covering was accumulated slowly, first by the wind depositing the sand, and secondly by the grass retaining what it could shelter, the increase in thickness being dependent on the rapidity of vegetable growth. I first stated my views on this subject at the Belfast meeting of the British Association in 1874, and since in several published papers (see *Journal of the Anthropological Institute*, vol. vii. No. 3, and ix. No. 3; *Proceedings Royal Irish Academy*, 2nd series, vol. ii. No. 3). All the evidence given by Sir Charles Lyell in "The Antiquity of Man," and by Dr. Geikie in "Prehistoric Europe," in reference to löss (löss) clearly points to its being in its present condition an accumulation also produced by the joint agencies of wind and vegetation, and I have no doubt, from reading of Dr. Nehring's and Count Wurmbrand's finds, that during the slow and steady growth of the löss, many Palæolithic land surfaces and sites of camps or dwellings may have been buried up, and may now occasionally be found in an undisturbed state. Newer surfaces with included remains may also be found higher up, as in every stage the valleys would be the most desirable places to live in.

At p. 165 Dr. Geikie mentions a theory advanced by Baron Richthofen as to the formation of löss in China. I express no opinion as to the first production of the fine material, but as to its deposition by the wind afterwards. I believe he was on the right track. In the case of the sand-hills I have studied, the portions covered by grass are still becoming higher. Would it not be interesting to find out if the löss, in any protected part, is also increasing in thickness at the present time?

Cullybackey, Belfast, February 18

W. J. KNOWLES

Pronunciation of Deaf Mutes who have been Taught to Speak

THE letter of Prof. A. Graham Bell in NATURE (vol. xxv. p. 124) is hardly conclusive of the matter. The evidence he adduces, though exceedingly valuable, is chiefly of a negative character.

M. Hément states as a matter of his own personal observation, that deaf-mutes who have been taught to speak, do so with the accent of their native district. M. Blanchard denies this because, according to him, the pronunciation of deaf-mutes does not possess that quality of accent distinguishing human voices. Mr. Bell agrees with the conclusion at which M. Blanchard has arrived, but denies the data on which the conclusion is based. Mr. Bell, in an examination of at least 400 deaf-mutes, has never noticed the tendency observed by M. Hément. "It is true," he adds, "that in a few cases dialectic (? dialectal) pronunciations are heard, but it always turns out upon investigation that such children could talk before they became deaf. The peculiarity is undoubtedly due to the unconscious recollection of former speech, and cannot correctly be attributed to heredity." M. Hément, however, reaffirms the accuracy of his own observations, and declares himself unable to conceive how in losing the case of speech, deaf-mutes should retain the unconscious memory of accent.

Prof. Graham Bell's theory will certainly not explain the case of Daniel Fraser, referred to in my previous letter, who is expressly stated to have "continued deaf and dumb from his birth till the seventeenth year of his age (*Philosophical Transactions*, No. 312). This case is all the more striking since the narrator mentions his inheritance of the Highland accent in a purely incidental manner.

I am fully aware of the weight to be attached to the evidence of an observer so able, precise, and accurate as Prof. Graham Bell, but that he has not noticed the peculiarity in question can hardly be held to invalidate the independent testimony of those who, in Paris, Madrid, and Inverness, declare that they have observed it. For my part I see no reason to doubt either their accuracy or their good faith.

E. A. AXON

Manchester

P.S.—It may be worth noting that the full discussion of the subject has appeared in the *Comptes rendus*, the current volume of which contains three notes by M. Hément, one by M. Blanchard, one by Mr. Bell, and one by the present writer.